United Nations ST/SG/AC.10/C.3/2015/3

Secretariat

Distr.: General
9 March 2015
English
Original: English and French

Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

Sub-Committee of Experts on the Transport of Dangerous Goods

Forty-seventh session
Geneva, 22 – 26 June 2015
Item 3 of the provisional agenda
Listing, classification and packing

Revised shipping name and description for sodium dithionite (UN1384)

Transmitted by the expert from Canada[1]

Purpose

1. To amend the current name and description of UN1384 SODIUM DITHIONITE to UN1384 SODIUM DITHIONITE, SOLID to better communicate that the solid or anhydrous form is the regulated dangerous goods.

Introduction

2. The expert from Canada recommends that the name and description for Sodium Dithionite (UN1384) explicitly state that the solid or anhydrous form is the regulated dangerous goods. This change is recommended to avoid situations where solutions of sodium dithionite may be mistakenly considered and handled as dangerous goods.

Background

3. Sodium dithionite, also referred to as sodium hydrosulfite or sodium hydrosulphite, is an important industrial chemical. As a strong reducing agent, sodium dithionite is often

[1] In accordance with the programme of work of the Sub-Committee for 2015–2016 approved by the Committee at its seventh session (see ST/SG/AC.10/C.3/92, paragraph 95 and ST/SG/AC.10/42, para. 15).

GE.15-04636 (E)

1504636

Please recycle

used as a bleaching agent in the textile and paper industries. Similarly, the chemical has proven successful in the treatment of heavy metal waste[2].

4. Solid anhydrous sodium dithionite decomposes exothermically in air on prolonged exposure to temperatures above 90°C to yield sodium sulphate (Na_2SO_4) and sulfur dioxide (SO_2). Above 150°C, in exclusion of air, vigorous decomposition occurs, yielding mainly sodium sulphite (Na_2SO_3), sodium thiosulfate ($Na_2S_2O_3$), sulfur dioxide (SO_2) and small amounts of sulfur[3]. Sulfur dioxide is known as a respiratory irritant to humans and is regulated as dangerous goods (i.e., UN1079).

5. Sodium dithionite, as an anhydrous solid, is known to undergo rapid exothermic decomposition in air on contact with a small amount of moisture. This reaction can give rise to such intense heat that it burns with a flame and ignites nearby combustible materials. Given the highly exothermic nature of the decomposition reaction, sodium dithionite (in its solid form) is classified as Class 4.2, Packing Group II – substances liable to spontaneous combustion.

6. Sodium dithionite, in solution, decomposes/disproportionates to sulfite, sulfur dioxide, and sodium thiosulfate as major decomposition products. The rate of decomposition proceeds faster under acidic conditions and oxygen consumption. For instance, decomposition was found to be rapid at pH values less than 5.5[4]. Although the decomposition reaction can release sulfur dioxide under strongly acidic conditions, this is not likely to occur under normal natural environmental conditions[5]. It is unlikely that sodium dithionite solution is transported under conditions that may cause a decomposition reaction – the solution is shipped under alkaline conditions to limit any such decomposition and preserve its value as a commercial reagent.[6] The other major decomposition products are not considered as dangerous goods.

7. Stable sodium dithionite solutions (i.e., limited rate of decomposition) can be maintained with cooled, alkaline and oxygen-excluded environments.

8. Recently, in Canada, an incident occurred where a tank spilled sodium dithionite solution. The emergency responder contacted Transport Canada's CANUTEC[7] office to determine the most appropriate emergency measures for the situation. CANUTEC provided measures to address sodium dithionite (solid form), as the respondent did not specify the form of the chemical (i.e., solution versus solid). Sodium dithionite in solution is not regulated as a dangerous good. Inappropriate response can be costly, harmful to the reputation of a company, and can affect its operations. It is therefore important that these types of situations be avoided.

9. The applicable portable tank special provision (i.e., TP33) for sodium dithionite (UN1384) supports the UN Model Regulations' intent to have the solid form of the chemical regulated as dangerous goods. TP33 refers to portable tanks for granular and powdered solids.

---

[2] http://www.tandfonline.com/doi/abs/10.1080/10426507.2014.914939#.VD7AZ2OZdPU

[3] http://www.inchem.org/documents/sids/sids/7775146.pdf

[4] Ibid.

[5] Ibid.

[6] http://www.chemtradelogistics.com/main/wp-content/uploads/Sodium_Hydrosulfite_Solution-English.pdf

[7] CANUTEC is the Canadian Transport Emergency Centre operated by the Transportation of Dangerous Goods Directorate of Transport Canada. The Directorate's overall mandate is to promote public safety in the transportation of dangerous goods by all modes.

10. Sodium dithionite solution aligns with the requirements outlined in paragraph 2.0.2.7 of the UN Model Regulations', which state that "a mixture or solution containing one or more substances identified by name in these Regulations or classified under a N.O.S. entry and one or more substances is not subject to these Regulations if the hazard characteristics of the mixture or solution are such that they do not meet the criteria (including human experience criteria) for any class". Therefore, it is recommended that the reference to sodium dithionite (UN1384) in the UN Model Regulations be clarified to explicitly reference the chemical in its solid form; the dangerous goods classification does not extend to solutions of sodium dithionite.

Proposal

11. It is proposed to amend the "Name and description" for UN 1384 SODIUM DITHIONITE in accordance with Table 1. This proposal aligns with the approach taken by this Sub-Committee and summarized in the February 2003 report (*ST/SG/AC.10/29/Add.1*)[8] on amendments to the twelfth revised edition of the UN Recommendations on the Transport of Dangerous Goods (Model Regulations). In this report, states (e.g., liquid, solid) were added to many UN-regulated dangerous goods, where the qualification as a dangerous goods or the classification may change based on the state.

Table 1: Summary of Proposed Amendments to Dangerous Goods List for Sodium Dithionite (Proposed changes in red)

UN No.	Name and description	Class or division	Subsidiary risk	UN Packing group	Special provisions	Limited and excepted quantities		Packaging		Portable tanks and bulk containers	
								Packing Instruction	Special Packing Provisions	Instructions	Special Provisions
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
-	3.1.2	2.0	2.2	2.0.1.3	3.3	3.4	3.5	4.1.4	4.1.4	4.2.5 / 4.3.2	4.2.5
1384	SODIUM DITHIONITE, SOLID; or SODIUM HYDROSULPHITE, SOLID	4.2		II		0	E2	P410 IBC06	B2	T3	TP33

[8] http://www.unece.org/fileadmin/DAM/trans/doc/2003/ac10/ST-SG-AC10-29a1e.pdf

United Nations ST/SG/AC.10/C.3/2015/4

Secretariat

Distr.: General
11 March 2015

Original: English

Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

Sub-Committee of Experts on the Transport of Dangerous Goods

Forty-seventh session
Geneva, 22 – 26 June 2015
Item 2 (c) of the provisional agenda
Explosives and related matters:
Review of tests in parts I and II of the Manual of Tests and Criteria

Test results relating to the Koenen test

Transmitted by the expert from Germany[1]

1. Reference is made to section 11, test series 1, type 1 (c), section 12, test series 2, type 2 (b), section 8, test series 8, type 8 (c), and section 25, test series E, type E.1.

2. During the last meeting of the IGUS[2] EOS[3] Working Group the quality of the steel tubes for the Koenen Test was discussed.

3. Tubes, which are used for the Koenen Test are deep drawn from sheet steel confirming to specification DC04 (EN 10027-1), or equivalent A620 (AISI/SAE/ASTM), or equivalent SPCEN (JIS G 3141).

3. Based on these specifications the content of manganese has to be less than 0.4 %.

4. According to information of the manufacturer in the old days the manganese content of the sheet steel was 0.32 %, now the content is 0.22 % or less because the former specification is no longer available. Nevertheless, the sheet steel is inside the specification of the standards!

5. For quality control of the steel tubes, 1% of the tubes from each production lot shall be subjected to quality control and the following data shall be verified

[1] In accordance with the programme of work of the Sub-Committee for 2015–2016 approved by the Committee at its seventh session (see ST/SG/AC.10/C.3/92, paragraph 95 and ST/SG/AC.10/42, para. 15).
[2] IGUS is the International Group of Experts on the Explosion Risks of Unstable Substances
[3] EOS is the Energetic and Oxidising Substances Working Group of IGUS

GE.15-04804 (E)
1504804

Please recycle

(a) The mass of the tubes shall be 26.5 ± 1.5 g, tubes to be used in one test sequenceshall not differ in mass by more than 1 g;

(b) The length of the tubes shall be 75 ± 0.5 mm;

(c) The wall thickness of the tubes measured 20 mm from the bottom of the tube shall be 0.5 ± 0.05 mm; and

(d) The bursting pressure as determined by quasi-static load through an incompressible fluid shall be 30 MPa ± 3 MPa.

6. The bursting pressure of steel tubes which are deep drawn from sheet steel with a manganese content of 0.22 % is between 25.2 MPa and 25.9 MPa, respectively. These steel tubes are formerly not inside the quality which is required by the UN Test Manual.

7. Based on the situation, that it was not possible for the manufacturer to get the former specification of sheet steel the IGUS EOS Working Group has asked companies and competent authorities to carry out tests on selected substances using former steel tubes (bursting pressure 30 MPa ± 3 MPa) on the one hand and using the new steel tubes (bursting pressure between 25.2 MPa and 25.9 MPa) on the other hand.

8. The IGUS EOS group wants to present the results as given below in the annex.

9. Based on the test results the observed effects on the steel tubes with a bursting pressure between 25.2 MPa and 25.9 MPa are comparable to the effects as observed before using the former steel tube quality.

10. The IGUS EOS Working Group recommends changing the steel tube bursting pressure criteria in terms of quality control to 28 MPa ± 4 MPa.

11. Consequently, the letter (d) in section 11 (no 11.5.1.2.1), section 12 (no 12.5.1.2.1), section 8 (18.6.1.2.1) and section 25 (no 25.4.1.2.1) might be amended as follows:

(d) The bursting pressure as determined by quasi-static load through an incompressible fluid shall be 28 MPa ± 4 MPa.

Annex

Test results

tert-Butylperoxy-2-ethylhexanoate

Old tubes	**New tubes**
Company: United Initiators	
2.0 mm	2.0 mm
Company: Akzo Nobel	
(1) 2.0 mm	(2) 2.0 mm
2.0 mm	

	Old tubes			**New tubes**	
	Akzo Nobel (1)	Akzo Nobel (2)	United Initiators	Akzo Nobel	United Initiators
Mass of the tube [g]	27.4	27.2	26.7	26.7	26.7
Sample mass [g]	24.3	24.3	25.8	24.3	25.8
Orifice diameter [mm]	2.0	2.0	2.0	2.0	2.0
Result	no explosion	Explosion	Explosion	Explosion	Explosion
Type of fragmentation	B	F	F	F	F
t_1 [s]	24	20	23	23	23
t_2 [s]	3	2	5	2	4

tert-Butylperoxybenzoate	
Old tubes	**New tubes**
Company: Akzo Nobel	
2.0 mm	2.0 mm
Company: United Initiators	
2.0 mm	2.0 mm

	New		**Old**	
	Akzo Nobel New	United Initiator New	Akzo Nobel Old	United Initiator Old
Mass of the tube [g]	26.4	26.3	27.0	26.4
Sample mass [g]	28.3	29.9	28.3	29.9
Orifice diameter [mm]	2.0	2.0	2.0	2.0
Result	Explosion	Explosion	Explosion	Explosion
Type of fragmentation	F	F	F	F
t_1 [s]	24	33	28	34
t_2 [s]	2	5	2	4

Di-tert-butyl peroxide	
Old tubes	**New tubes**
Company: United Initiators	
1 mm	1 mm
Company: Akzo Nobel	
1 mm	1 mm

	New		**Old**	
	Akzo Nobel New	United Initiator New	Akzo Nobel Old	United Initiator Old
Mass of the tube [g]	26.4	26.6	27.2	26.0
Sample mass [g]	21.6	22.3	21.6	22.3
Orifice diameter [mm]	1.0	1.0	1.0	1.0
Result	No explosion	No explosion	No explosion	No explosion
Type of fragmentation	0	0	0	0
t_1 [s]	15	17	14	20
t_2 [s]	21	36	20	26

4-Amino-3-hydrazino-1,2,4-triazole			
Old tubes		**New tubes**	
BAM		BAM	
3 mm		3 mm	3 mm
Mass of the tube [g]	25.8	26.5	26.2
Sample mass [g]	18.6	18.2	18.2
Orifice diameter [mm]	3.0	3.0	3.0
Result	Explosion	Explosion	Explosion
Type of fragmentation	F	F	F
t_1 [s]	7	6	7
t_2 [s]	3	3	0